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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/US99/21655 <b>(22) International Filing Date:</b> 17 September 1999 (17.09.1999) <b>(30) Priority Data:</b> 60/100,981 18 September 1998 (18.09.1998) US <b>(60) Parent Application or Grant</b> i2 TECHNOLOGIES, INC. [/]; O. NOTANI, Ranjit, N. [/]; O. KENNERLY, Christopher, W.; O.		<b>Published</b>
<b>(54) Title: SYSTEM AND METHOD FOR MULTI-ENTERPRISE SUPPLY CHAIN OPTIMIZATION</b> <b>(54) Titre: SYSTEME ET PROCEDE D'OPTIMISATION D'UNE CHAINE D'APPROVISIONNEMENT ENTRE PLUSIEURS ENTREPRISES</b>		
<b>(57) Abstract</b> <p>A method of optimizing multi-enterprise supply chain agreements using an electronic option contract includes determining at a buyer computer a range of forecasted demand for a product and communicating from the buyer computer to a seller computer an offer to enter into an option contract for the supply of a product, the option contract including an option corresponding to the range of forecasted demand. The method further includes executing the option contract, updating at the buyer computer the forecasted demand, and exercising the option in the option contract within the range of forecasted demand based on the updated forecasted demand.</p> <b>(57) Abrégé</b> <p>L'invention concerne un procédé pour optimiser des contrats de chaîne d'approvisionnement entre plusieurs entreprises au moyen d'un contrat d'option électronique. Le procédé consiste à déterminer, au niveau de l'ordinateur d'un acheteur, une gamme de demandes prévues pour un produit et à communiquer de l'ordinateur de l'acheteur à celui du vendeur une offre de passer un contrat d'option pour l'approvisionnement d'un produit, le contrat d'option incluant une option correspondant à la gamme des demandes prévues. Le procédé consiste en outre à exécuter le contrat d'option, à mettre à jour au niveau de l'ordinateur de l'acheteur la demande prévue, et à mettre en oeuvre l'option stipulée dans le contrat d'option, dans les limites de la gamme de demandes prévues, sur la base de la demande prévue mise à jour.</p>		

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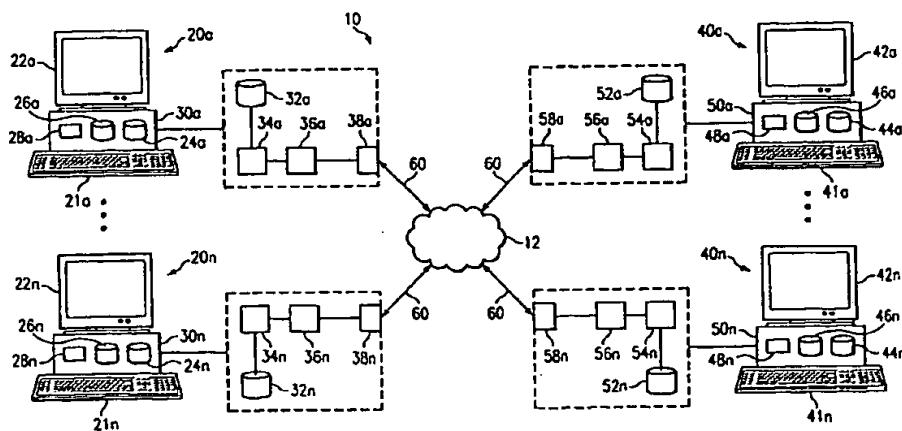
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(54) Title: SYSTEM AND METHOD FOR MULTI-ENTERPRISE SUPPLY CHAIN OPTIMIZATION



(57) Abstract

A method of optimizing multi-enterprise supply chain agreements using an electronic option contract includes determining at a buyer computer a range of forecasted demand for a product and communicating from the buyer computer to a seller computer an offer to enter into an option contract for the supply of a product, the option contract including an option corresponding to the range of forecasted demand. The method further includes executing the option contract, updating at the buyer computer the forecasted demand, and exercising the option in the option contract within the range of forecasted demand based on the updated forecasted demand.

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**Description**

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SYSTEM AND METHOD FOR MULTI-ENTERPRISE SUPPLY CHAIN  
OPTIMIZATION

TECHNICAL FIELD OF THE INVENTION

The present invention relates to the field of data communication and processing, and more particularly to a system and method for optimizing multi-enterprise supply chain agreements.

BACKGROUND OF THE INVENTION

Various algorithms have been developed to help optimize supply chains within an enterprise to avoid overstock or undersupply conditions caused by mismatches in supply and demand forecasts. While several algorithms have been developed to address supply chain optimization within a single enterprise, none have addressed supply chain optimization between enterprises.

Conventional approaches to supply chain optimization typically assume that the enterprise can impose supply chain optimization rules on itself without regard to the interests of other enterprises. In the context of multi-enterprise trading where supply chain optimization rules must be negotiated, the typical approaches break down. In the context of multi-enterprise trading, therefore, supply/demand mismatches are common.

SUMMARY OF THE INVENTION

In accordance with the present invention, a system and method for optimizing multi-enterprise supply chains are provided that substantially reduce or eliminate disadvantages or problems associated with previously developed supply chain optimization techniques.

In one embodiment, a method of optimizing multi-enterprise supply chain agreements using an electronic option contract comprises determining at a buyer computer a range of forecasted demand for a product and communicating from the buyer computer to a seller computer an offer to enter into an option contract for the supply of a product, the option contract including an option corresponding to the range of forecasted demand. The method further comprises executing the option contract, updating at the buyer computer the forecasted demand, and exercising the option in the option contract within the range of forecasted demand based on the updated forecasted demand.

In another embodiment, a method of optimizing multi-enterprise supply chain agreements using an electronic option contract comprises receiving at a seller computer terms of an option contract from a buyer computer, the terms comprising an option corresponding to a buyer's range of forecasted demand for a product, communicating to the buyer computer an acceptance of the terms of the option contract, storing the terms of the accepted option contract in a memory accessible to the seller computer and enforcing the terms of the option contract at the seller computer without user input.

Technical advantages of the present invention include a system and method for optimizing multi-enterprise supply chains. Through a variety of mechanisms, the invention increases the profitability of both parties to the

5 contract. By implementing one or more option terms in the  
contract, the invention reduces uncertainty in each party's  
10 forecasts. Providing one or more dimensions of flexibility  
to the buyer entity (e.g., options as to quantity, product,  
5 geography, etc.) provides value to the buyer entity in-  
allowing it to defer the determination of the exact scope  
15 of its obligations until a later time, when the buyer  
entity can more accurately determine its actual supply  
needs. - reducing supply/demand mismatches. The invention  
20 provides a mechanism to ensure a win-win situation for both  
buying and selling parties by setting an option price to  
account for the value to the buyer entity and the  
corresponding cost to the seller entity. In addition, the  
25 invention provides an incentive for each party to provide  
15 the most accurate forecasts possible by providing for  
well-defined penalties for violation of the terms of the  
resulting contract.

30 The use of an option contract provides a significant  
advantage in on-line negotiations between a buyer computer  
20 and a seller computer. By using option contracts to  
specify a range or aggregation of potential parameter  
values (such as a range of quantities or products desired,  
35 or a range of delivery locations), the invention avoids  
scores of iterations and transmissions across the  
25 communication link coupling the buyer and seller computers,  
making on-line negotiations technically feasible and very  
40 efficient.

45 Other technical advantages are readily apparent to one  
of skill in the art from the attached figures, description,  
30 and claims.

#### BRIEF DESCRIPTION OF THE DRAWINGS

50 For a more complete understanding of the present  
invention, and for further features and advantages thereof,



reference is now made to the following description taken in conjunction with the accompanying drawings, in which:

FIGURE 1 is a block diagram of an exemplary system for optimizing multi-enterprise supply chains constructed according to the present invention;

FIGURES 2a and 2b are block diagrams of an exemplary buyer computer and an exemplary seller computer, respectively, constructed according to the teachings of the present invention;

FIGURES 3a and 3b are block diagrams of an exemplary portion of a memory accessible to a buyer computer and an exemplary portion of a memory accessible to a seller computer, respectively, constructed according to the present invention;

FIGURE 4 shows exemplary terms of an option contract executed between a buyer computer and a seller computer according to the present invention;

FIGURE 5 is a flow chart showing an exemplary method of optimizing multi-enterprise supply chain agreements using an electronic option contract; and

FIGURE 6 is a flow chart showing another exemplary method of optimizing a multi-enterprise supply chain agreement using an electronic option contract.

#### DETAILED DESCRIPTION OF THE INVENTION

FIGURE 1 is a block diagram of an exemplary multi-enterprise supply chain optimization system 10 that includes a plurality of buyer computers 20a-20n and a plurality of seller computers 40a-40n. In one aspect of operation, one or more buyer computers 20 communicate with one or seller computers 40 to collaborate in negotiating the supply by a seller and procurement by a buyer of products offered by sellers associated with seller computers 40. Buyer computers 20 and seller computers 40

5 cooperate to strive toward an optimum supply chain between  
buyers associated with buyer computers 20 and sellers  
10 associated with seller computers 40. Ideally, through an  
interactive negotiation process and contractual monitoring  
5 system, system 10 eliminates mismatches between the buyer's  
demand and the seller's supply, increasing the  
15 profitability of each enterprise.

Each of buyer computers 20 may execute with any of the  
well-known MS-DOS, PC-DOS, OS-2, MAC-OS, WINDOWS™, UNIX, or  
10 other appropriate operating systems. Each buyer computer  
20 may comprise, for example, a desktop computer, a laptop  
computer, a personal digital assistant, or any other  
computing or communicating device. Each buyer computer 20  
includes an input device 21, an output device 22, random  
25 access memory (RAM) 24, read-only memory (ROM) 26, CD-ROM,  
hard drive, or other magnetic or optical storage media 28  
or other appropriate volatile or nonvolatile storage and  
retrieval devices, and a processor 30 having a system clock  
30 or other suitable timing device or software.

20 Input device 21 may comprise, for example, a keyboard,  
mouse, graphics tablet, touch screen, pressure-sensitive  
pad, joystick, light pen, microphone, or other suitable  
35 input device. Output device 22 may comprise, for example,  
a video display, a printer, a disk drive, a plotter, a  
25 speaker, or other suitable output device.

40 Items within the dashed lines in FIGURE 1 represent  
exemplary functional operation and data organization of the  
associated components of system 10. For example, each  
buyer computer 20 includes or otherwise has access to a  
45 memory 32. Memory 32 may comprise any of a variety of data  
structures, arrangements or compilations operable to store  
and facilitate retrieval of various information stored  
locally at buyer computer 20. Although memory 32 is  
50 depicted as residing within buyer computer 20, all or any

5 portion of memory 32 could alternatively reside at a remote location accessible to buyer computer 20.

10 Buyer computer 20 executes one or more software applications 34. As used in this document, the term  
5 "software application" refers to a set of instructions, procedures, functions, objects, classes, and/or instances, and related data adapted for implementation in a suitable  
15 computer language such as C, C++, Java, or any other appropriate development language. In the illustrated embodiment, software application 34 comprises a procurement  
20 manager operable to assist buyer computer 20 in negotiating and executing supply chain contracts with various seller computers 40.

25 In this embodiment, each of seller computers 40 is similar in structure and function to buyer computers 20. For example, each of seller computers 40 may execute with  
15 any of the well-known MS-DOS, PC-DOS, OS-2, MAC-OS, WINDOWS™, UNIX, or other appropriate operating systems and may comprise a computing or communicating device, such as  
30 a desktop computer, a laptop computer, or a personal digital assistant. Each seller computer 40 includes an input device 41, an output device 42, random access memory (RAM) 44, read-only memory (ROM) 46, CD-ROM, hard drive, or  
35 other magnetic or optical storage media 48 or other appropriate volatile or nonvolatile storage and retrieval devices, and a processor 50 having a system clock or other suitable timing device or software. In addition, each  
40 seller computer 40 includes or otherwise has access to a memory 52. Like buyer computer 20, seller computer 40  
45 executes one or more software applications 54. In the illustrated embodiment, software application 54 comprises a supply manager operable to allow seller computer 40 to negotiate and/or execute supply chain contracts with  
50 various buyer computers 40.

5 Buyer computers 20 and seller computers 40 communicate  
with one another using communication links 60. In the  
10 illustrated embodiment, communication links 60 comprise  
communication media suitable to provide a connection  
5 between buyer computers 20 and/or seller computers 40 and  
a network 12. In this embodiment, network 12 comprises a  
15 global computer network, such as the Internet. Network 12  
may, however, include any suitable wireline, wireless, or  
combination wireline/wireless system that supports  
10 communication between network elements using ground-based  
and/or space-based components. For example, network 12 may  
20 be public switched telephone networks (PSTN), integrated  
services digital networks (ISDN), local area networks  
(LAN), wide area networks (WAN), or other communication  
25 systems or combination of communication systems at one or  
more locations. Communication links 60 and network 12  
shown as connecting buyer computers 20 and seller computers  
40 may comprise a single network, or separate networks.

30 Buyer computers 20 and seller computers 40 include  
20 interfaces 38 and 58, respectively, to facilitate  
connection to communication links 60. These interfaces  
include the appropriate hardware (e.g., modem, network  
35 interface card, etc.) and software (e.g., multi-layer  
protocol support, protocol conversion, data processing,  
25 data modulation, etc.) to communicate using a direct  
connection to a PSTN or ISDN, a connection through a LAN,  
40 WAN, or global computer network such as the Internet, or  
any other suitable communication connection that allows  
network elements to communicate using communication links  
45 40.

50 Buyer computers 20 and seller computers 40 also  
include browsers 36 and 56, respectively. Browsers 36 and  
56 may comprise any suitable software, hardware, or  
combination thereof, operable to facilitate access to — and

5 user interaction with - other network elements. In the  
10 illustrated embodiment, browsers 36 and 56 comprises  
Internet browsers, such as Netscape™ Communicator available  
5 from Netscape Communications Corporation, or Microsoft  
Explorer™, available from Microsoft Corporation. Browsers  
36 and 56 may comprise stand-alone functional elements, as  
15 shown in the illustrated embodiment. Alternatively, all or  
a portion of the functionality of browsers 36 and 56 could  
be integrated into other components of system 10, such as  
20 interfaces 38 and 58, respectively.

20 Throughout this description, components in system 10  
store, communicate, and access information using any  
format, structure, or arrangement including without  
25 limitation machine-readable or user-readable text and  
15 graphics. In a particular embodiment, information  
exchanged in system 10 includes documents or files written  
in hypertext mark-up language (HTML), HTML Plus, standard  
30 generalized mark-up language (SGML), virtual reality  
mark-up language (VRML), extended markup language (XML),  
20 java objects, or any other appropriate content development  
language. Information in system 10 may also include  
program code, such as applets written in JAVA developed by  
35 SUN MICROSYSTEMS, or other appropriate self-executing code.

25 In operation, system 10 facilitates collaborative  
negotiations between one or more buyer computers 20 and one  
40 or more seller computers 40 to result in an electronic  
option contract for the supply of particular products to  
buyers utilizing system 10. Either buyer computer 20 or  
seller computer 40 may initiate a negotiation by  
45 transmitting proposed contract terms to the other machine.  
30

50 In a particular embodiment, buyer computer 20 and  
seller computer 40 may negotiate an option contract for the  
supply and purchase of a particular product offered by a  
seller associated with seller computer 40. The resulting

option contract contains one or more options, which specify obligations of the buyer entity with respect to the purchase of a product, and an obligation of the seller entity with respect to the supply of that product. In a particular embodiment, the option may specify a minimum obligation of the buyer in purchasing the product and a maximum obligation of the seller in supplying the product. The option, however, could relate to any level of obligation between the parties.

The option contract may further include an option price representing a payment of the buyer entity to the seller entity for the value of the option to the buyer entity and the cost of the option to the seller entity. In addition, the option contract may include penalty provisions for deviation from the terms of the contract.

The use of an option contract provides a significant advantage in on-line negotiations between buyer computer 20 and seller computer 40. Without the use of an options contract, each computer 20 and 40 of system 10 would have to run an optimization algorithm on particular parameter values, obtain a result, and pass the intermediate result to the other machine over network 12, where that result would be evaluated, modified, and retransmitted back to the other machine. This process would continue until an apparently optimum value was reached. By using option contracts to specify a range or aggregation of potential parameter values (such as a range of quantities or products desired, or a range of delivery locations), system 10 avoids scores of iterations and transmissions across network 12, and instead allows each computer 20, 40 to process an entire range of suggested values without transmitting intermittent suggested values back and forth across network 12.

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Once the terms of the contract have been negotiated, the option contract is executed. In a particular embodiment, the terms of the executed option contract are stored at the buyer computer 20 and the seller computer 40. Storing the contract terms facilitate monitoring each party's progress in fulfilling of its contractual obligations. In addition, system 10 can enforce the terms of the contract by, for example, prohibiting buyer computer 20 from exercising the buyer entity's options in a manner inconsistent with the contract's terms, or by assessing penalties for violation of contract's terms.

Through the use of electronic option contracts, system 10 increases supply chain efficiency by providing a comfortable level of certainty in the obligations of each party, while maintaining adequate flexibility to avoid supply/demand mismatches.

FIGURES 2a and 2b are block diagrams of an exemplary buyer computer 20 and an exemplary seller computer 40, respectively. As discussed above, buyer computer 20 includes a memory 32, a procurement manager 34, a browser 36, and an interface 38. Similarly, seller computer 40 includes a memory 52, a supply manager 54, a browser 56, and an interface 58.

Elements of buyer computer 20 communicate with one another over a communication link 110. Communication link 110 may comprise any suitable arrangement of hardware and/or software operable to facilitate communication between elements within or peripherally coupled to buyer computer 20. For example, communication link 110 may comprise a universal serial bus. Elements of seller computer 40 communicate with one another over a communication link 210. Communication link 210 of seller computer 40 is similar in structure and function to communication link 110 of buyer computer 20.

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In the illustrated embodiment, procurement manager 34 and supply manager 54 each include a variety of modules responsible for providing particular functionality and processing capabilities. The particular number and arrangement of modules shown in FIGURES 2a and 2b are for illustrative purposes only. Other and/or additional arrangements, configurations, relationships, and processing divisions could be incorporated without departing from the scope of the invention.

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In this embodiment, procurement manager 34 includes a forecast module 112. Forecast module 112 operates to provide estimates of the buyer entity's future demand based, for example, on historical demand and projected market changes. Similarly, supply manager 54 of seller computer 40 includes a forecast module 212. Forecast module 212 may provide estimates of the seller's supply capacity, and may also estimate various customers' projected demand based, for example, on a past course of dealing with that customer. Buyer computer 20 and seller computer 40 can be configured to share information, such as the assumptions each is using in calculating its estimate. By sharing information and allowing each entity to critique the other's forecasts and underlying assumptions, system 10 provides an additional advantage of facilitating collaborative forecasting, which provides more accurate forecasts resulting in increased efficiency due to fewer mismatches in supply and demand.

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Procurement manager 34 and supply manager 114 also include negotiation modules 114 and 214, respectively. Negotiation modules 114 and 214 operate to conduct negotiations between buyer computer 20 and seller computer 40 with respect to terms of the contract being negotiated. In a particular embodiment, negotiations modules 114 and 214 can be configured to conduct all or a part of the



negotiations between buyer computer 20 and seller computer 40 without requiring user input.

To further facilitate negotiations between buyer computer 20 and seller computer 40, procurement manager 34 and supply manager 54 include aggregation modules 116 and 216, respectively. Aggregation modules 116 and 216 cooperate to align and perform any desirable transformation of parameters being negotiated. For example, certain contract parameters may be expressed as an option, or range of possible values. Aggregation module 116 ensures consistency between the underlying parameters on which each machine bases its computations, so that both parties have a consistent understanding of the terms of the resulting contract.

Procurement manager 34 and supply manager 54 may also include option price modules 118 and 218, respectively. Option price module 118 of buyer computer 20 estimates the value to the buyer of having flexibility to specify the buyer's obligation as a range instead of a fixed obligation. Option price module 218 of seller computer 40 estimates the cost to the seller of having a higher potential supply obligation under the contract than the buyer's potential obligation to purchase. The option price ultimately contained in the option contract reflects a balance between the flexibility gained by the buyer entity and the cost to the seller entity of facilitating that flexibility, and may also reflect the relative bargaining strength of the parties involved. For example, a dominant buyer may be in a position to demand an option without paying any option price, or by paying a lower option price.

Procurement manager 34 and supply manager 54 further include execution modules 119 and 219, respectively. Execution modules 119 and 219 operate to execute the option

contracts and to store the terms of the option contracts in memories 32 and 52, respectively.

Procurement manager 34 and supply manager 54 may also include tracking modules 120 and 220, respectively.

Tracking modules 120 and 220 allow buyer computer 20 and seller computer 40 to monitor and enforce the terms of any currently pending contract.

Memory 32 of buyer computer 20 includes a variety of files. In the illustrated embodiment, memory 32 includes a buyer information file 130, which can store various information relating to the buyer entity's business, as well as its historical and projected supply needs. Forecast module 112 and/or aggregation module 116 may access buyer information file 130 to obtain information helpful in forecasting supply needs and performing any necessary aggregate transformation during negotiations with seller computer 40.

Memory 32 further includes a contract information file 132, which stores information relating to currently pending contracts. Tracking module 120 can access contract information file 132, to observe and/or modify information associated with currently pending contracts as the contracts progress. Memory 32 may further include negotiation information file 134, which includes various information useful in negotiating the terms of a contract. For example, negotiation information file 134 may include historical price lists, previous discounts offered by the seller entity or competitors of the seller entity, acceptable delivery schedules, and other information relating to previously negotiated contracts. Negotiation module 114 may access negotiation information file 134 in determining whether to accept suggested contractual terms, counter-offer, or flag a particular issue as a problem requiring user attention.

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Memory 52 of seller computer 40 contains similar information files. For example, memory 52 includes a seller information file 230 containing various information relating to the seller entity's business, as well as its historical and projected ability to meet demand needs. Forecast module 212 and/or aggregation module 216 may access seller information file 230 to obtain information helpful in forecasting the seller entity's inventory and ability to meet projected demand needs, as well as to perform any necessary aggregate transformation during negotiations with seller computer 40.

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Memory 52 further includes a contract information file 232, which stores information relating to currently pending contracts. Tracking module 220 can access contract information file 232, to observe and/or modify information associated with currently pending contracts as the contracts progress. Memory 32 may further include negotiation information file 234, which includes various information useful in negotiating the terms of a contract. For example, negotiation information file 234 may include price lists previously given to particular buyers, discounts available to particular buyers, acceptable delivery schedules, and other information relating to previously negotiated contracts. Negotiation module 214 may access negotiation information file 234 in determining whether to accept suggested contractual terms, counter-offer, or flag a particular issue as a problem requiring user attention.

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In operation, forecast module 112 of buyer computer 20 may initially approximate its supply needs by applying current and/or historical supply data to various supply forecasting and optimization models to yield approximate supply needs. These supply needs may be expressed in terms

5 of, for example, a product type, a quantity of product,  
and/or a geographical region.

10 Known information may suggest that it is appropriate  
to rely on the accuracy of one or more of the  
5 approximations. For example, it may be known that an  
enterprise in particular geographical region may currently  
15 be out of stock of a particular product; it may further be  
known that the enterprise has a need for that product by a  
particular date. In that case, the particular product,  
10 geographic region of the enterprise, and delivery date can  
be specified with confidence.

20 In other cases, for various reasons, such as  
uncertainty in market conditions, the approximations  
yielded by the forecasting and optimization models may be  
25 suspect or uncertain. Continuing with the previous  
example, while it may be known that a particular enterprise  
in a particular geographical location will require some  
level of a particular product by a specified date, the  
30 exact quantity required may not be ascertainable with any  
certainty. Forecast module 112 may account for this  
uncertainty by specifying the quantity parameter as a range  
of potential values, or as an option to purchase a quantity  
35 between a minimum specified quantity and a maximum  
specified quantity.

25 Buyer computer 20 may, through negotiation module 114,  
40 derive suggested contractual terms, such as the price of  
the product, the execution date of the contract, an  
exercise date or range of exercise dates for any option  
ranges identified by forecast module 112, and/or any other  
45 term desired to be included in a supply contract.  
Negotiations module 114 may consult, for example, buyer  
information file 130 and/or negotiation information file  
134 in deriving the suggested contractual terms.

5 Buyer computer 20 communicates the suggested  
contractual terms - including forecasted supply  
10 requirements expressed as a range or an option - to seller  
computer 40 associated with the seller supplying the  
5 desired product or products. Negotiation modules 114 and  
214 of buyer computer 20 and seller computer 40,  
15 respectively, begin with the suggested contract terms and  
negotiate the terms of an option contract for the supply of  
the desired product(s). Prior to or during the  
10 negotiation process, aggregation modules 116 and 216 may  
perform any necessary or desired aggregation alignment  
20 and/or transformation. Aggregation modules 116 and 216 may  
access buyer information file 112 and seller information  
file 212 to determine a common aggregation of parameters to  
25 be implemented in the contract.

FIGURES 3a and 3b are block diagrams of an exemplary  
portion of memory 32 associated with buyer computer 32 and  
of memory 52 associated with seller computer 40,  
30 respectively. In the illustrated embodiment, buyer  
information file 130 includes product information 310,  
20 which comprises a compilation of various information  
related to the products that the buyer entity using buyer  
computer 20 uses. In this example, product information 310  
35 is arranged by product type 312; each product type 312 is  
further arranged by vendor 314, and then by product model  
25 316-322.

40 Seller information file 230 of memory 52 also includes  
product information 410, which is similar to product  
information 310 stored in memory 32. However, product  
45 information 410 stored in memory 52 comprises a slightly  
different aggregation than product information 310 stored  
in memory 32. To ensure that buyer computer 20 and seller  
computer 40 are able to negotiate consistent contractual  
50 terms, it may be desirable to use aggregation modules 116

5 and 216 to determine a common aggregation of parameters.  
In this case, buyer computer 20 arranges its product  
10 information 310 by product type, vendor, and model number;  
seller computer 40 arranges its product information 410 by  
5 product type, product sub-type 412, product application  
414, and model 416-428. To provide a consistent  
15 aggregation, aggregation module 116 of buyer computer 20  
may temporarily reaggregate buyer product information 310  
to be consistent with seller product information 410. For  
20 example, aggregation module 116 may disaggregate the buyer  
product information 310 down to its most granular level (in  
this case, model numbers 316-322) and then build an  
aggregation to match that of seller product information  
410.

25 15 As a particular example, buyer computer 20 may suggest  
a contract option comprising an offer to purchase a  
quantity of "desktop computers." The aggregation of  
"desktop computers" would commit the buyer entity to  
30 purchase some number of the seller entity's desktop  
20 computers, but give the buyer entity flexibility in  
selecting which particular model or models to purchase  
until a later date. Aggregation modules 116 and 216,  
35 therefore, facilitate specification of ranges of  
obligations that each party is willing to undertake. The  
25 parameters expressed as a range of possible values may  
ultimately be incorporated into the option contract in the  
40 form of an option.

The options ultimately incorporated into the option  
contract specify a range of values which represents an  
45 obligation on the buyer entity to purchase the product and  
an obligation on the seller entity to supply the product.  
Although the previous example suggested an option as to the  
particular product models selected, similar options could  
50 be created that specify, for example, a range of quantity

5 of a particular product desired, a range of geographical  
regions to be served, and/or various other attributes  
10 associated with the buyer entity's supply needs. Resulting  
contracts could have one or several dimensions of options.

5 For example, a resulting option contract could specify the  
delivery location (region), but may create an option as to  
15 the exact product to be delivered and the exact quantity  
demanded. Any combination of option as to region, product,  
quantity, or other appropriate parameter could be  
20 implemented without departing from the scope of the  
invention.

Facilitating negotiation of an option contract  
provides an advantage to the buyer enterprise in allowing  
the buyer enterprise to defer the determination of the  
25 15 exact scope of its obligations until a later time, when the  
buyer entity can more accurately determine its actual  
supply needs. This flexibility, however, comes at a cost  
to the seller entity, who must be prepared to meet the  
30 maximum contractual obligation even if the buyer entity  
ultimately chooses a narrower contractual scope. The  
20 seller entity may, therefore, desire compensation for this  
added cost in the form of an option price.

35 As part of the negotiation process, buyer computer 20  
and seller computer 40 may determine an option price based,  
25 for example, on the value of the option to the buyer entity  
and the cost of the option to the seller entity.  
40 Generally, the greater the flexibility offered to the buyer  
entity, the higher the cost to the seller entity, and the  
higher the option price. In determining the option price,  
30 option price module 118 of buyer computer 20 may determine  
the value of a particular option range to the buyer entity.  
45 Likewise, option price module 218 of seller computer 40 may  
determine the seller entity's cost of providing that  
50 option. Through an iterative process, buyer computer 20

5 and seller computer 40 can determine an option range  
associated with an option price acceptable to both the  
10 buyer and the seller.

Continuing with the negotiation process, negotiation  
5 modules 114 and 214 may access negotiation information  
files 134 and 234 to ascertain acceptable compromises in  
15 parameter values, such as, price, quantity, delivery  
locations, and/or delivery timing. Negotiation information  
files 134 and 234 comprise information, such as, price  
10 lists 342; previous discounts offered 344, 442; and other  
previous contractual terms 346, 444. Negotiation modules  
114 and 214 may be programmed to accept proposed contract  
terms provided that they fall in a given range or bear a  
particular relation to previously negotiated terms. In  
25 addition, negotiation modules 114 and 214 may be programmed  
to flag certain contractual terms as problem issues, which  
require user intervention and negotiation.

Once the terms of the option contract are negotiated,  
30 execution modules 119 and 219 of buyer computer 20 and  
seller computer 40 and/or the users of those machines  
20 execute the option contract. In the illustrated  
embodiment, both buyer computer 20 and seller computer 40  
35 store the terms of the option contract in memories 32 and  
52, respectively. Referring again to FIGURES 3a and 3b, the  
negotiated contractual terms are stored in contract  
25 information files 132 and 232 of buyer computer 20 and  
seller computer 40, respectively.

In the illustrated embodiment, contract information  
files 132 and 232 store information relating to each  
45 contract 332 and 432, respectively. Among the information  
stored is the terms of the contract 334 and 434, and  
tracking information 336 and 436. Tracking modules 120 and  
220 of buyer computer 20 and seller computer 220,  
50 respectively, may access contract information files 132 and



232, respectively, to monitor and enforce the performance of the negotiated contracts.

FIGURE 4 shows an example of terms of an option contract 500 executed by buyer computer 20 and seller computer 40. Among the terms of the option contract is an identification of: the buying enterprise 510, the selling enterprise 512, the execution date 514, the delivery date 516, the product to be delivered 518, the delivery location 520, the sales price 522, and a penalty provision 524 to be exercised in the event of a violation of the terms of option contract 500.

Also among the terms of contract 500 is an indication of the contract type 502. In this particular example, buyer computer 20 and seller computer 40 have negotiated an incrementally exercised quantity options contract. The optional term in this contract is the precise quantity that the buyer entity will be obligated to purchase and that the seller entity will be obligated to supply. Contract terms 526 and 526 specify the upper and lower limits, respectively, of the quantity option 530. According to this contract, the buyer entity will ultimately be responsible for purchasing at least 8,000 units; the seller will be responsible for supplying up to 10,000 units. For this option, the parties have negotiated an option price 532 of \$5,000.

Option contract 500 also specifies a range of exercise dates 534 specifying the earliest possible date 536 that the buyer entity can exercise its option under contract 500, and the latest possible date 538 by which the buyer entity must exercise its option under contract 500. This particular contract is an incrementally exercised contract. Under this type of contract, beginning at the exercise start period 536, the buyer entity may incrementally place several individual orders for the desired product over the

5 course of the exercise period 534. The seller entity has  
10 agreed to supply the cumulative total of all orders placed  
during the exercise period. This type of contract is  
particularly advantageous to the buyer entity, as it allows  
5 the buyer entity to estimate a flexible range of quantity  
over a range of time. The buyer entity can then place  
15 purchase orders according to its actual demand during the  
exercise period, greatly reducing or eliminating the  
chances of supply demand mismatches.

10 In processing this type of contract, seller computer  
20 40 accepts buyer computer 20's orders after the beginning  
exercise date 536. Seller computer 40 receives purchase  
orders as long as the cumulative amount of product ordered  
does not exceed the upper quantity limit 528 specified in  
25 contract 500 and until the exercise end date 538. Seller  
computer could, of course, be programmed to accept purchase  
orders specifying a quantity greater than upper quantity  
limit 528 or orders received before the beginning exercise  
30 date 536 or after the exercise end date 538. Under the  
20 terms of contract 500, however, seller computer 40 is not  
required to accept such orders.

35 Seller computer 40 stores a record of each purchase  
order received and, after expiration of the exercise period  
534, facilitates delivery of a cumulative total order not  
25 exceeding upper quantity limit 528. If buyer computer 20  
fails to reach the lower quantity limit 526 by the end of  
40 the exercise period 538, seller computer 40 may impose  
penalty 524 in an amount commensurate with the buying  
entity's shortfall in purchase orders. By the same token,  
45 30 if the seller entity fails to deliver a valid quantity of  
product, or delivers the product too late or to the wrong  
destination, buyer computer 20 may impose penalty 524 for  
the seller entity's violation.

System 10 provides significant advantages in optimizing supply chains in a multi-enterprise trading environment. Through a variety of mechanisms, system 10 increases the profitability of both parties to the contract. By using one or more option terms in the contract, system 10 reduces uncertainty in each party's forecasts. Providing one or more dimensions of flexibility to the buyer entity (e.g., options as to quantity, product, geography, etc.) provides value to the buyer entity in allowing it to later select optimum exercise values for the option parameters - reducing supply/demand mismatches. System 10 provides a mechanism to ensure a win-win situation for both parties by setting an option price to account for the value to the buyer entity and the corresponding cost to the seller entity. In addition, providing for well-defined penalties for violation of the terms of the resulting contract provides an incentive for each party to provide the most accurate forecasts possible.

FIGURE 5 is a flow chart showing an exemplary method 600 of optimizing multi-enterprise supply chain agreements using an electronic option contract. In this particular example, the method 600 describes a process for implementing an electronic incrementally exercised option contract 500 (FIGURE 4). The method begins at step 605 where buyer computer 20 determines a range of forecasted demand. For example, forecast module 112 of buyer computer 20 initially approximates the buyer's demand by applying current and/or historical data to various demand forecasting and optimization models to yield an approximate forecasted demand. Based on, for example, statistical models identifying historical or estimated errors in the forecasted demand, forecasting module 112 identifies a range of forecasted demand which accounts for these potential errors.

Computer 20 also determines an option price associated with the range of forecasted demand at step 610. For example, option price module 118 may determine the value of the flexibility gained by the range of forecasted demand (as opposed to a fixed forecasted demand) and assign an option price corresponding to that value. At some point, preferably prior to negotiating with seller computer 40, buyer computer 20 may contact seller computer 40 and perform aggregation alignment and translation at step 615. For example, aggregation module 116 of buyer computer 20 may communicate with aggregation module 216 of seller computer 40 to establish a common aggregation of contract terms. Buyer computer 20 communicates an offer to enter into an option contract to seller computer 40 at step 620. The offer to enter into an option contract includes an option corresponding to the range of forecasted demand identified by buyer computer 20, and may also include a proposed option price.

Typically, buyer computer 20 will receive alternate proposed contract terms from seller computer 40 at step 625. Negotiation module 114 may analyze the alternate proposed contract terms by accessing memory 32 to determine a range of acceptable contract terms at step 630, and determining at step 635 whether the alternate proposed contract terms are within the range of acceptable contract terms retrieved from memory 32. If negotiation module 114 determines at step 640 that the alternate proposed terms are within the acceptable range retrieved from memory 32, negotiation module 114 may accept the alternate proposed terms without user input at step 650. In the event that negotiation module 114 determines at step 640 that the alternate proposed terms are not within the acceptable range retrieved from memory 32, negotiation module 114 may identify the alternate proposed contract term or terms as

5 requiring user input prior to acceptance at step 645. A  
user of buyer computer 20 may intervene to negotiate the  
10 nonaccepted proposed term, and execution module 119 may  
execute the contract at step 655. In addition, execution  
5 module 119 may store the terms of the executed contract in  
contract information file 132 of memory 32.

15 In this particular example, the executed contract 500  
(see FIGURE 4) is an incrementally exercised option  
contract. Tracking module 120 determines at step 660  
10 whether the exercise period 534 has begun. Anytime after  
exercise period 534 has begun, tracking module 120 may  
20 initiate, or act in response to a user input requesting an  
update of the buyer's forecasted demand. Forecasting  
module 112 updates the buyer's forecasted demand to  
25 15 determine the buyer's current demand needs. Exercise  
module 121 communicates a request to seller computer 40 to  
exercise the option in the contract according to the  
updated forecasted demand at step 670. Tracking module 120  
30 stores the value of the updated forecasted demand in  
20 contract information file 132 of memory 32.

Tracking module 120 next determines at step 675  
35 whether the exercise of the option satisfies the buyer's  
minimum obligation, in this case specified by lower  
quantity limit 526 of contract 500. If the buyer's minimum  
25 obligation has not been met, tracking module 120 determines  
at step 680 whether the exercise period has ended. If the  
40 exercise period has ended, and the buyer's minimum  
obligation has not been met, tracking module 120 determines  
a penalty at step 685 for the buyer's short fall in its  
45 30 minimum obligation. If, however, tracking module 120  
determines at step 680 that time remains in the exercise  
period, tracking module 120 awaits another update to the  
buyer's forecasted demand at step 665.

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Even where the buyer's minimum obligation has been met at step 675, the terms of contract 500 allow buyer computer 20 to place further purchase orders prior to the expiration of the exercise period. For example, procurement manager 34 may determine at step 690 that despite the buyer's minimum obligation being met, the exercise period has not ended. If buyer computer 20 received an indication, either through user input or through information stored in memory 32, that the buyer entity desires more product at step 695, procurement manager may communicate another updated forecast demand at step 665 requesting additional product. In a particular embodiment, procurement manager 34 may be programed to refuse to communicate another updated forecast demand if it determines at 698 that the seller's maximum obligation has been met. For example, contract 500 specifies an upper quantity limit 528 of ten thousand units. If buyer computer 20 has already requested ten thousand units, procurement manager 34 can be programed to disallow further requests to seller computer 40.

FIGURE 6 is a flow chart showing an exemplary method of optimizing a multi-enterprise supply chain agreement. Method 700 begins at step 705 where supply manager 54 of seller computer 40 receives proposed terms of an option contract 500 from buyer computer 20. Aggregation module 216 may align and translate the aggregation of parameters in option contract 500 at step 710.

Typically, forecast module 212 will determine a range of forecasted supply capacity at step 715 and an option price associated with that range of forecasted supply capacity at step 720. Based on these calculations, negotiation module 214 of supply manager 54 may determine at step 725 whether the contract terms proposed by buyer computer 20 are acceptable. In addition, or in the alternative, negotiation module 214 may consult negotiation

5 information file 234 to determine whether the proposed  
contract terms are acceptable. If the proposed contract  
10 terms are found to be acceptable at step 725, execution  
module 219 executes the option contract at step 740. If,  
5 however, negotiation module 214 determines at step 725 that  
the proposed contract terms are not acceptable, negotiation  
15 module 214 may communicate alternate proposed contract  
terms to buyer computer 20 at step 730 and negotiate the  
ultimate terms of the contract at step 735. The  
20 negotiating step 735 may include comparing proposed  
contract terms to a range of acceptable terms stored in  
negotiation file 234, and identifying particular terms as  
requiring user input prior to acceptance.

Execution module 219 stores the terms of the executed  
25 contract in memory 52 at step 745. This example, like the  
one described with respect to FIGURE 5, addresses the  
execution of an incrementally exercised option contract 500  
(see FIGURE 4). Upon receiving a request from buyer  
30 computer 20 to exercise an option in the contract at step  
750, supply manager 54 accesses memory 52 to determine the  
20 terms of the option contract at step 755. Supply manager  
54 determines at step 760 whether exercise period 534 has  
35 begun. If supply manager 54 determines at step 760 that  
exercise period 534 has not begun, supply manager 54  
25 notifies buyer computer 20 at step 765 that its request is  
improper, in this case because it is premature. Of course,  
40 supply manager 54 can be programmed to accept premature  
purchase orders.

If supply manager 54 determines at step 760 that  
45 exercise period 534 has begun, it determines at step 770  
whether the request exceeds the maximum seller obligation.  
In this case, the option 530 in contract 500 is a quantity  
option specifying a lower quantity limit 526 and an upper  
50 quantity limit 528. Lower quantity limit 526 specifies the

5 minimum obligation of the buyer in purchasing the specified  
product, and upper quantity limit 528 specifies the maximum  
10 obligation of the seller in supplying that product. If  
supply manager 54 determines at 770 that the exercise  
5 request from buyer computer 20 exceeds the maximum seller  
obligation, in this case upper quantity limit 528, supply  
15 manager 54 notifies buyer computer 20 that its request is  
improper at step 765. Of course, supply manager 54 could  
be programmed to accept exercise requests that exceed the  
10 maximum seller obligation, for example, those exceeding the  
maximum seller obligation by a predetermined amount.  
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If supply manager 54 determines at step 770 that the  
exercise request received from buyer computer 20 does not  
exceed the maximum seller obligation, it stores the  
25 15 exercise request at step 775 in contract information file  
232 of memory 52. Supply manager 54 determines at step 780  
whether the exercise period 534 has ended. For example,  
30 supply manager 54 may compare a current date (obtained, for  
example, from the system clock of seller computer 40) with  
20 exercise period end date 538. If supply manager 54  
determines at step 780 that the exercise period 534 has not  
ended, it may receive another exercise request at step 785  
35 from buyer computer 20 and process that request as  
described above.

25 If supply manager 54 determines at step 780 that  
exercise period 534 has ended, it determines at step 790  
40 whether the minimum obligation 526 of the buyer has been  
met. In this case, the minimum buyer obligation 526 is a  
requirement that the buyer purchased a minimum quantity of  
45 30 product. If supply manager 54 determines at step 790 that  
the buyer's minimum obligation has not been met, it  
determines a penalty at step 795 for the buyer's short  
fall. In this example, contract 500 contains a penalty  
50 provision 524 specifying a penalty of one dollar per unit



5 of quantity violation. Tracking module 220 accesses  
contract information file 232 to identify this contract  
10 provision, compare it to the quantity exercised by buyer  
computer 20, and calculate a resulting penalty.

5 Supply manager 54 facilitates satisfaction of the  
seller's obligation at step 800. For example, supply  
15 manager 54 can be programmed to automatically schedule  
delivery of the exercised quantity of product if that  
exercised quantity is at least equal to the lower quantity  
10 limit 526 and not more than the upper quantity limit 528.  
Of course, supply manager 54 can also be programmed to  
20 accommodate deliver of non-conforming quantity requests.

Although the present invention has been described in  
several embodiments, a myriad of changes, variations,  
25 15 alterations, transformations, and modifications may be  
suggested to one skilled in the art, and it is intended  
that the present invention encompass such changes,  
variations, alterations, transformations, and modifications  
30 as fall within the spirit and scope of the appended claims.

## Claims

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WHAT IS CLAIMED IS:

1. A method of optimizing multi-enterprise supply chain agreements using an electronic option contract, the method comprising:

determining at a buyer computer a range of forecasted demand for a product;

communicating from the buyer computer to a seller computer an offer to enter into an option contract for the supply of a product, the option contract including an option corresponding to the range of forecasted demand;

executing the option contract;

updating at the buyer computer the forecasted demand; and

exercising the option in the option contract within the range of forecasted demand based on the updated forecasted demand.

2. The method of Claim 1, wherein the option comprises a range of parameters selected from a group consisting of:

a minimum quantity of a product that the buyer is obligated to purchase, and a maximum quantity of the product that the seller is obligated to supply;

a minimum number of product types that the buyer is obligated to purchase, and a maximum number of product types that the seller is obligated to supply; and

a minimum number and a maximum number of locations where a product must be delivered.

3. The method of Claim 1, wherein the option comprises a plurality of ranges of parameters each selected from a group consisting of:

5 a minimum quantity of a product that the buyer is  
obligated to purchase, and a maximum quantity of the  
10 product that the seller is obligated to supply;

5 a minimum number of product types that the buyer is  
obligated to purchase, and a maximum number of product  
types that the seller is obligated to supply; and

15 a minimum number and a maximum number of locations  
where a product must be delivered.

10 4. The method of Claim 1, wherein the option  
contract includes an exercise period comprising a period of  
20 time after the execution of the option contract during  
which the buyer must exercise its option.

25 15 5. The method of Claim 4, wherein exercising the  
option comprises:

30 specifying a first quantity of product desired at a  
first time during the exercise period;

20 specifying a second quantity of product desired at a  
second time during the exercise period;

35 and wherein the updated forecasted demand comprises  
the sum of the first and second quantities of product  
desired.

25 6. The method of Claim 1, further comprising:

40 receiving from the seller computer a modified range of  
forecasted demand comprising the range of forecasted demand  
modified by an optimization model at the seller computer;  
and

45 30 accepting the modified range of forecasted demand as  
a term to the option contract.

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7. The method of Claim 1, further comprising:  
receiving a proposed contract term from the seller  
computer;

accessing a memory comprising a range of acceptable  
contract terms; and  
comparing the proposed contract term to the range of  
acceptable contract terms.

8. The method of Claim 7, further comprising:  
determining that the proposed contract term is within  
the range of acceptable contract terms; and  
accepting the proposed contract term without user  
input.

9. The method of Claim 7, further comprising:  
determining that the proposed contract term is not  
within the range of acceptable contract terms; and  
identifying the proposed contract term as a term  
requiring user input prior to acceptance.

10. The method of Claim 1, further comprising:  
determining at the buyer computer a proposed option  
price comprising a value of the option to a buyer  
associated with the buyer computer;  
communicating from the buyer computer to the seller  
computer the proposed option price; and  
negotiating with the seller computer an agreed option  
price based on the value of the option to the buyer and a  
cost of the option to a seller associated with the seller's  
computer.

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11. The method of Claim 10, wherein negotiating an agreed option price comprises:

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receiving from the seller computer a modified proposed range of forecasted demand comprising the proposed range of forecasted demand modified by an optimization model at the seller computer;

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determining a modified proposed option price based on the modified proposed range of forecasted demand; and

communicating the modified proposed option price to the seller computer.

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12. A method of optimizing multi-enterprise supply chain agreements using an electronic option contract, the method comprising:

5 receiving at a seller computer terms of an option contract from a buyer computer, the terms comprising an option corresponding to a buyer's range of forecasted demand for a product;

15 communicating to the buyer computer an acceptance of the terms of the option contract;

10 storing the terms of the accepted option contract in a memory accessible to the seller computer; and

20 enforcing the terms of the option contract at the seller computer without user input.

25 13. The method of Claim 12, wherein the option comprises a range of parameters selected from a group consisting of:

30 a minimum quantity of a product that the buyer is obligated to purchase, and a maximum quantity of the product that the seller is obligated to supply;

35 a minimum number of product types that the buyer is obligated to purchase, and a maximum number of product types that the seller is obligated to supply; and

25 a minimum number and a maximum number of locations where a product must be delivered.

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10 14. The method of Claim 12, wherein the option comprises a plurality of ranges of parameters each selected from a group consisting of:

5 a minimum quantity of a product that the buyer is obligated to purchase, and a maximum quantity of the product that the seller is obligated to supply;

15 a minimum number of product types that the buyer is obligated to purchase, and a maximum number of product types that the seller is obligated to supply; and

10 20 a minimum number and a maximum number of locations where a product must be delivered.

25 15 15. The method of Claim 12, wherein the option contract includes an exercise period comprising a period of time after the execution of the option contract during which the buyer must exercise its option, and wherein enforcing the terms of the option contract comprises:

30 receiving a request from the buyer computer to exercise the buyer's option comprising an identification of the buyer's exercised level of demand under the contract;

20 35 accessing the memory to retrieve the stored contract terms, including an exercise period begin date and an exercise period end date; and

25 comparing a current date to the exercise period begin date and the exercise period end date.

40 16. The method of Claim 15, further comprising: determining that the exercise period has begun and has not expired; and

45 30 accepting the buyer computer's request to exercise the buyer's option.



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10 17. The method of Claim 16, wherein the buyer computer's request comprises an identification of a first quantity of product desired, and further comprising:

5 storing the request for a first quantity of product desired in the memory;

15 receiving a subsequent request from the buyer computer to exercise the buyer's option comprising an identification of a second quantity of product desired;

10 determining that the exercise period has not yet expired; and

20 storing the request for a second quantity of product desired in the memory.

18. The method of claim 16, further comprising:

25 15 comparing the buyer's exercised demand level to a minimum obligation of the buyer under the contract; and

30 determining a penalty if the buyer's minimum obligation level exceeds the buyer's exercised demand level after the expiration of the exercise period.

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10 19. A procurement manager operable to be executed on the processor of a buyer computer, the procurement manager comprising:

5 a forecast module operable to determine the buyer's range of forecasted demand for a product;

15 a negotiation module operable to communicate to a seller computer an offer to enter into an option contract for the supply of a product, the option contract including a proposed option corresponding to the range of forecasted demand, the negotiation module further operable to receive from the seller computer a modified range of forecasted demand, to communicate the modified range of forecasted demand to the forecast module, and to receive from the forecast module a compromised range of forecasted demand;

25 15 an execution module operable to execute an option contract including an option corresponding to the compromised range of forecasted demand; and

30 an exercise module operable to receive from the forecast module an updated forecasted demand within the comprised range of forecasted demand and to communicate to the seller computer a request to exercise the option with the updated forecasted demand.

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25 20. The procurement manager of Claim 19, wherein the option comprises a range of parameters selected from a group consisting of:

40 a minimum quantity of a product that the buyer is obligated to purchase, and a maximum quantity of the product that the seller is obligated to supply;

45 30 a minimum number of product types that the buyer is obligated to purchase, and a maximum number of product types that the seller is obligated to supply; and

50 a minimum number and a maximum number of locations where a product must be delivered.

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21. The procurement manager of Claim 19, wherein the option comprises a plurality of ranges of parameters each selected from a group consisting of:

5 a minimum quantity of a product that the buyer is obligated to purchase, and a maximum quantity of the product that the seller is obligated to supply;

15 a minimum number of product types that the buyer is obligated to purchase, and a maximum number of product types that the seller is obligated to supply; and

10 20 a minimum number and a maximum number of locations where a product must be delivered.

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22. The procurement manager of Claim 19, wherein the option contract includes an exercise period comprising a period of time after the execution of the option contract during which the buyer must exercise its option, and wherein the exercise module is further operable to specify a first quantity of product desired at a first time during the exercise period and to specify a second quantity of product desired at a second time during the exercise period, the buyer's obligation under the option contract comprising the sum of the first and second quantities of product desired.

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23. The procurement manager of Claim 19, wherein the negotiating module is further operable to receive a proposed contract term from the seller computer, access a memory comprising a range of acceptable contract terms, determine that the proposed contract term is within the range of acceptable contract terms, and to accept the proposed contract term without user input.

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24. The procurement manager of Claim 19, wherein the negotiating module is further operable to receive a proposed contract term from the seller computer, access a memory comprising a range of acceptable contract terms, determine that the proposed contract term is not within the range of acceptable contract terms, and to identify the proposed contract term as a term requiring user input prior to acceptance.

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25. The procurement manager of Claim 19, further comprising an aggregation module operable to compare a buyer's aggregation of parameters with a seller's aggregation of parameters, and to transform at least one of the aggregations of parameters to conform with a common aggregation of parameters.

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26. The procurement manager of Claim 19, further comprising an option price module operable to determine a proposed option price comprising a value of the option to a buyer associated with the procurement manger and to communicate the proposed option price to a seller computer, and wherein the negotiation module is operable to negotiate with the seller computer an agreed option price based on the value of the option to the buyer and a cost of the option to a seller associated with the seller's computer.

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27. The procurement manger of Claim 19, further comprising a tracking module operable to store terms of the executed option contract and to track the buyer's fulfillment of its obligations under the option contract.

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10 28. A supply manager operable to be executed on the processor of a seller computer, the supply manager comprising:

5 a forecast module operable to determine the seller's range of forecasted supply capacity for a product;

15 a negotiation module operable to receive from a buyer computer an offer to enter into an option contract for the supply of a product, the option contract including a proposed option corresponding to a range of forecasted demand;

20 an execution module operable to execute the option contract and to store the terms of the option contract in a memory accessible to the seller computer; and

25 15 a tracking module operable to receive a request from the buyer computer to exercise the option, to access the memory to determine the terms of the option contract, and to determine whether to grant the request to exercise the option.

30 20 29. The supply manager of Claim 28, wherein the option comprises a range of parameters selected from a group consisting of:

35 a minimum quantity of a product that the buyer is obligated to purchase, and a maximum quantity of the product that the seller is obligated to supply;

40 a minimum number of product types that the buyer is obligated to purchase, and a maximum number of product types that the seller is obligated to supply; and

45 30 a minimum number and a maximum number of locations where a product must be delivered.

5  
10 30. The supply manager of Claim 28, wherein the option comprises a plurality of ranges of parameters each selected from a group consisting of:

5 a minimum quantity of a product that the buyer is obligated to purchase, and a maximum quantity of the product that the seller is obligated to supply;

15 a minimum number of product types that the buyer is obligated to purchase, and a maximum number of product types that the seller is obligated to supply; and

10 20 a minimum number and a maximum number of locations where a product must be delivered.

25 31. The supply manager of Claim 28, wherein the option contract includes an exercise period during which the buyer must exercise its option, and wherein the option contract comprises a maximum supply quantity that the seller has agreed to supply, and wherein the request to exercise the option comprises a first request for a first quantity of product desired, and wherein the tracking module is operable to store the request in the memory if a current date is within the exercise period and the first quantity is less than or equal to the maximum supply quantity.

25 32. The supply manager of Claim 31, wherein the request to exercise the option comprises a second request for a second quantity of product desired, and wherein the tracking module is operable to store the request in the memory if a current date is within the exercise period and the sum of the first and second quantities is less than or equal to the maximum supply quantity.

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5 33. The supply manager of Claim 28, wherein the option contract comprises a penalty term specifying a penalty for a violation of the contract terms, and wherein the tracking module is operable to identify a violation of the contract terms and to assess a penalty for the violation based on the penalty term.

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10 34. The supply manager of Claim 28, wherein the offer to enter into the option contract comprises a proposed term, and wherein the negotiation module is operable to access a memory comprising a range of acceptable contract terms, determine that the proposed contract term is within the range of acceptable contract terms, and to accept the proposed contract term without user input.

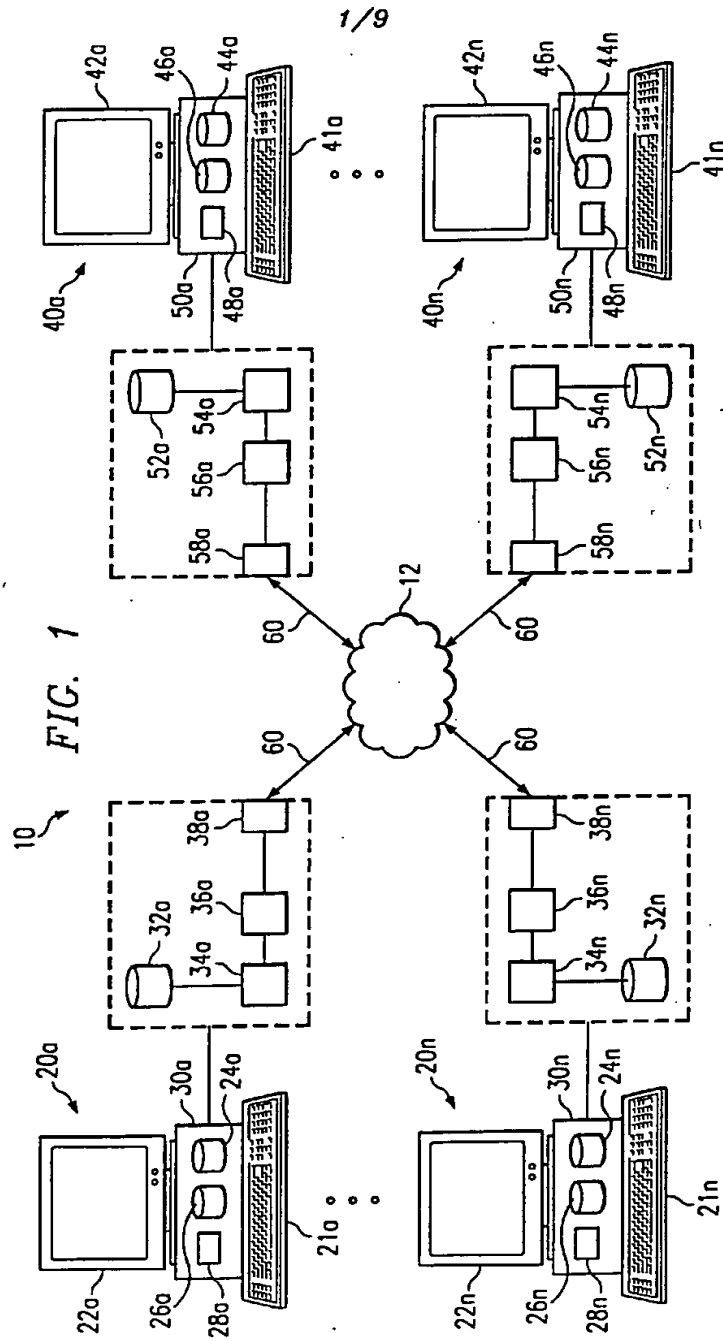
25 15 35. The supply manager of Claim 28, wherein the offer to enter into the option contract comprises a proposed term, and wherein the negotiation module is operable to access a memory comprising a range of acceptable contract terms, determine that the proposed contract term is not within the range of acceptable contract terms, and to identify the proposed contract term as a term requiring user input prior to acceptance.

25 36. The supply manager of Claim 28, further comprising an aggregation module operable to compare a buyer's aggregation of parameters with a seller's aggregation of parameters, and to transform at least one of the aggregations of parameters to conform with a common aggregation of parameters.

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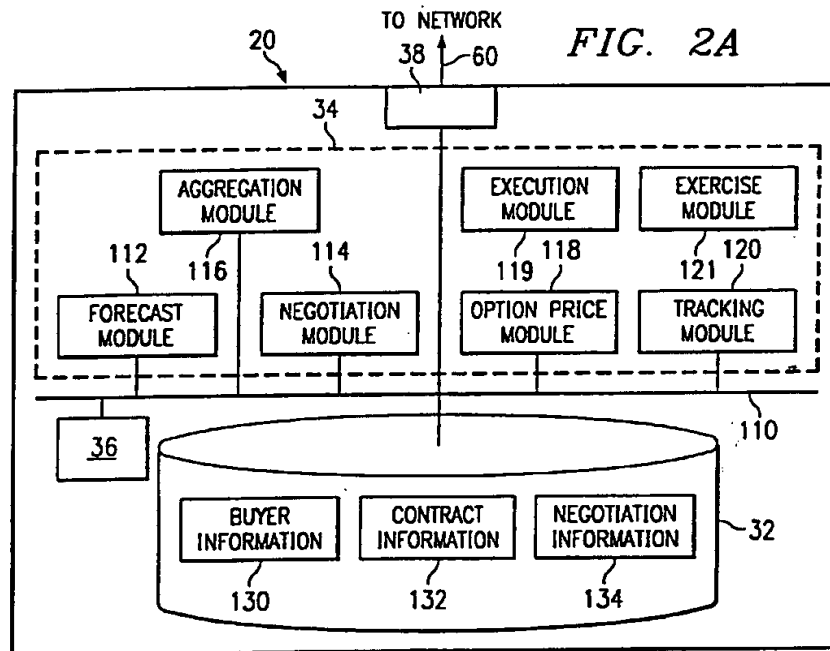
37. The supply manager of Claim 28, further comprising an option price module operable to determine a proposed option price comprising a cost of the proposed option to a seller associated with the supply manger and to communicate the proposed option price to the buyer\_ computer, and wherein the negotiation module is operable to negotiate with the seller computer an agreed option price based on the value of the option to the buyer and a cost of the option to a seller associated with the seller's computer.





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FIG. 2A



*FIG. 2B*

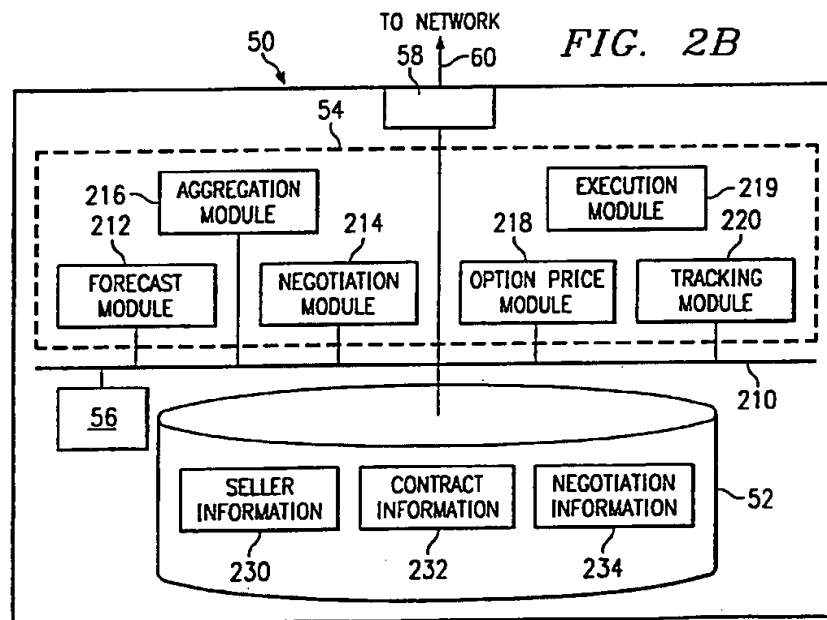


FIG. 3A

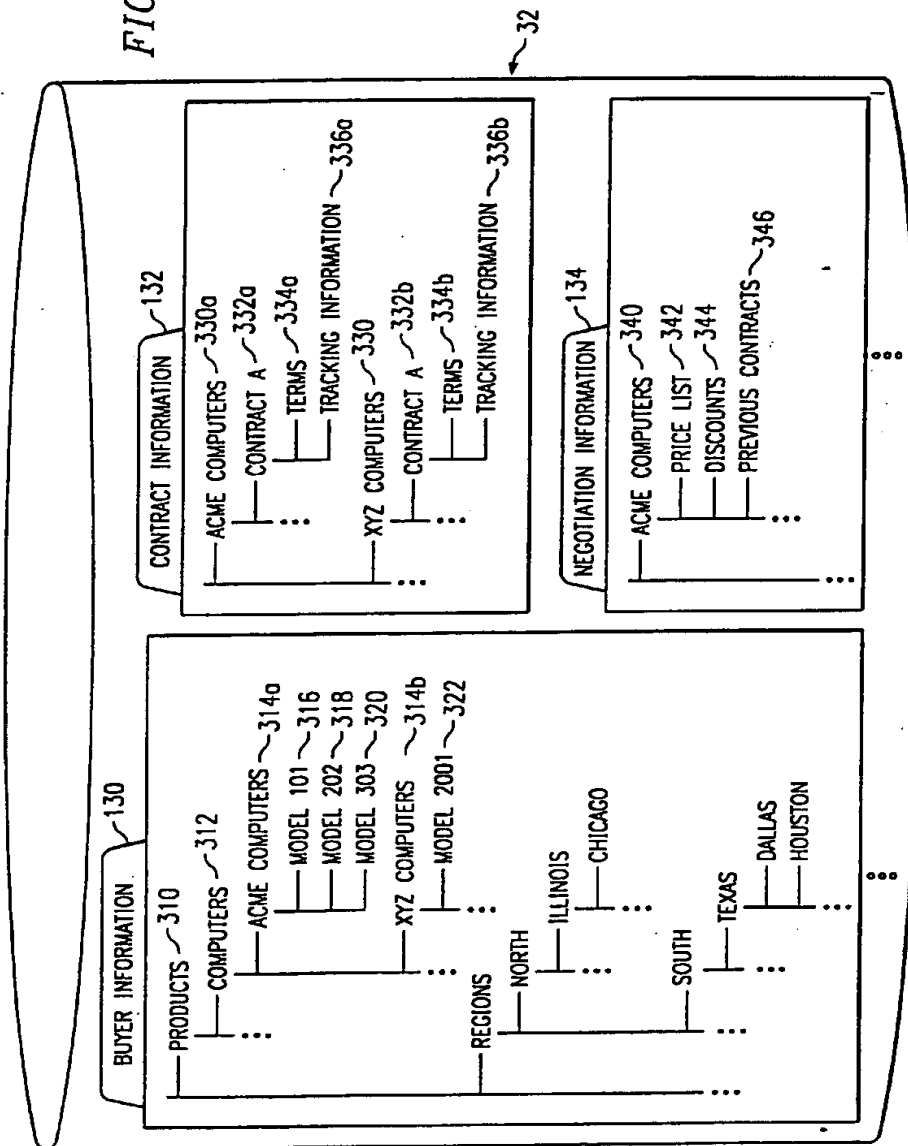
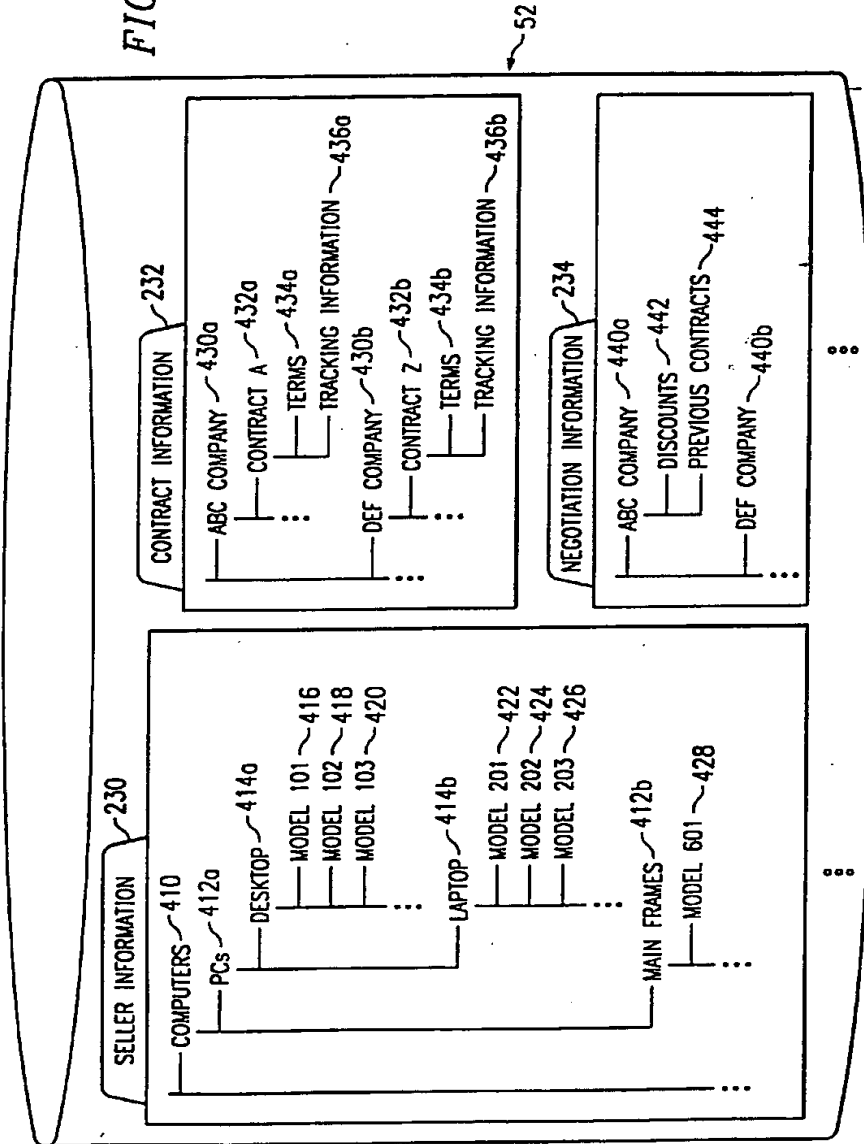


FIG. 3B

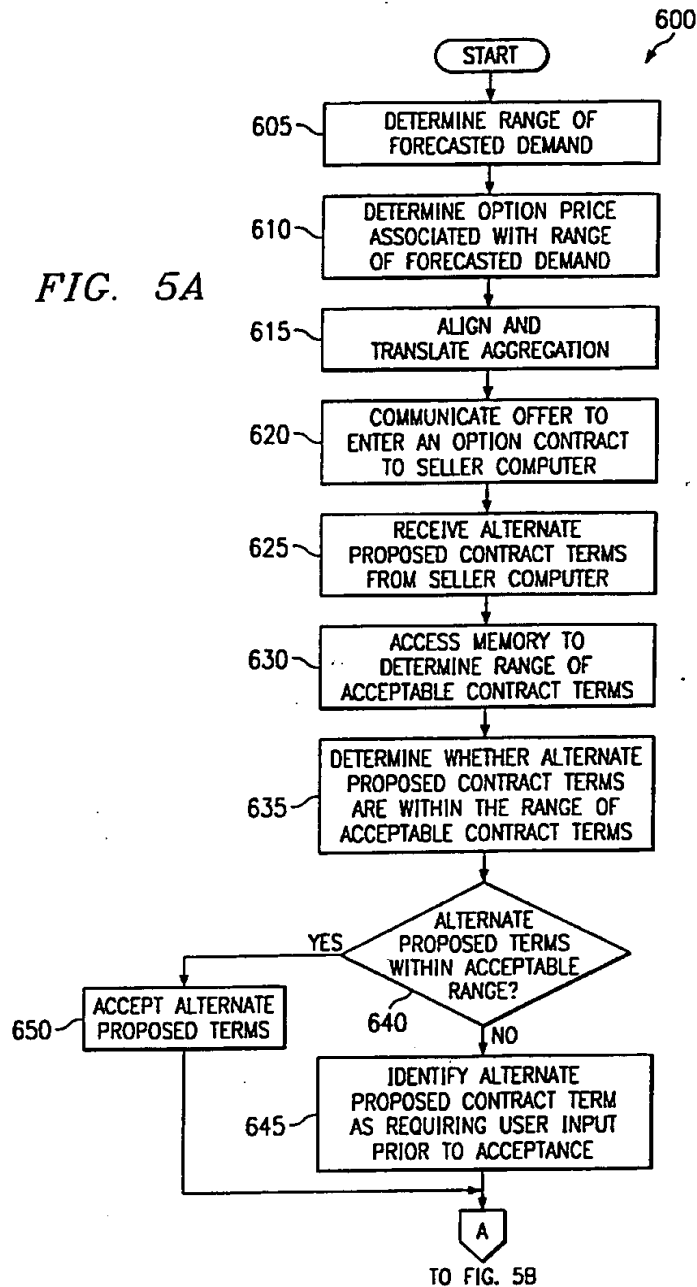


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*FIG. 4* 500

502 ~ TYPE: INCREMENTALLY EXERCISED QUANTITY OPTIONS CONTRACT  
510 ~ BUYING ENTERPRISE: B  
512 ~ SELLING ENTERPRISE: Y  
514 ~ EXECUTION DATE: SEPT 5, 1999  
536 ~ EXERCISE PERIOD BEGIN: JAN 15, 2000 }  
538 ~ EXERCISE PERIOD END: MAR 15, 2000 } 534  
516 ~ DELIVERY DATE: APRIL 1, 2000  
518 ~ SUPPLIER ITEM: WIDGET XYZ OF ENTERPRISE Y  
520 ~ BUYER SITE: DALLAS DISTRIBUTION CENTER OF ENTERPRISE B  
526 ~ LOWER QUANTITY LIMIT: 8000 }  
528 ~ UPPER QUANTITY LIMIT: 10000 } 530  
524 ~ PENALTIES FOR VIOLATION: \$1/UNIT OF QUANTITY VIOLATION  
522 ~ PRICE: \$100/UNIT  
532 ~ OPTION PRICE: \$5000

FIG. 5A



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FIG. 5B

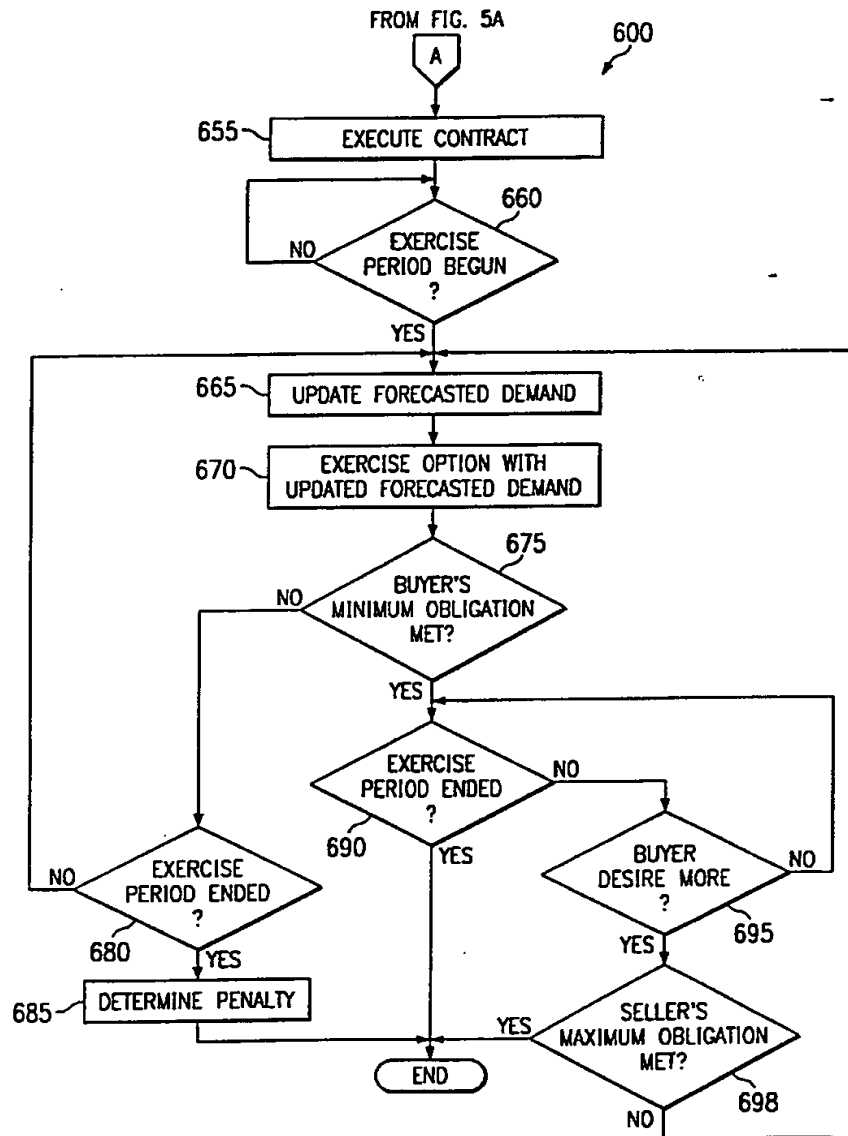
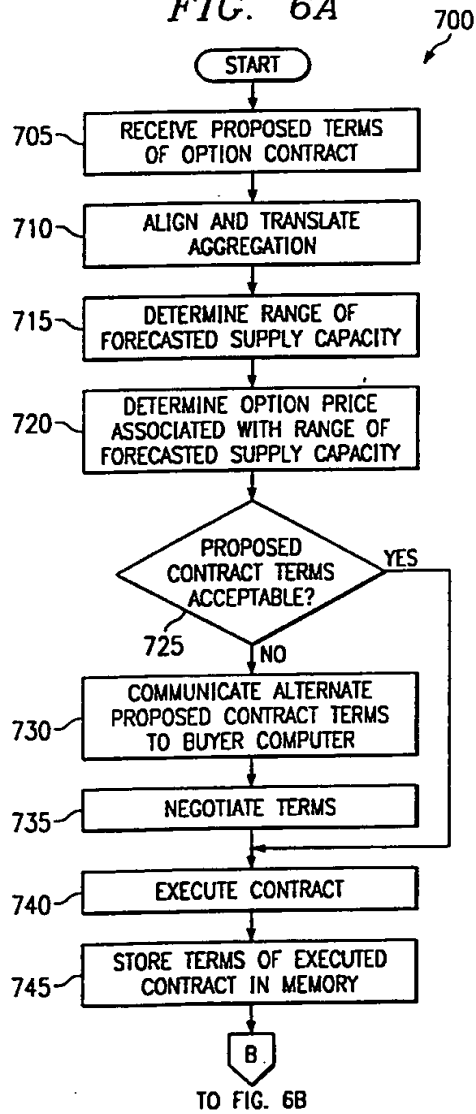
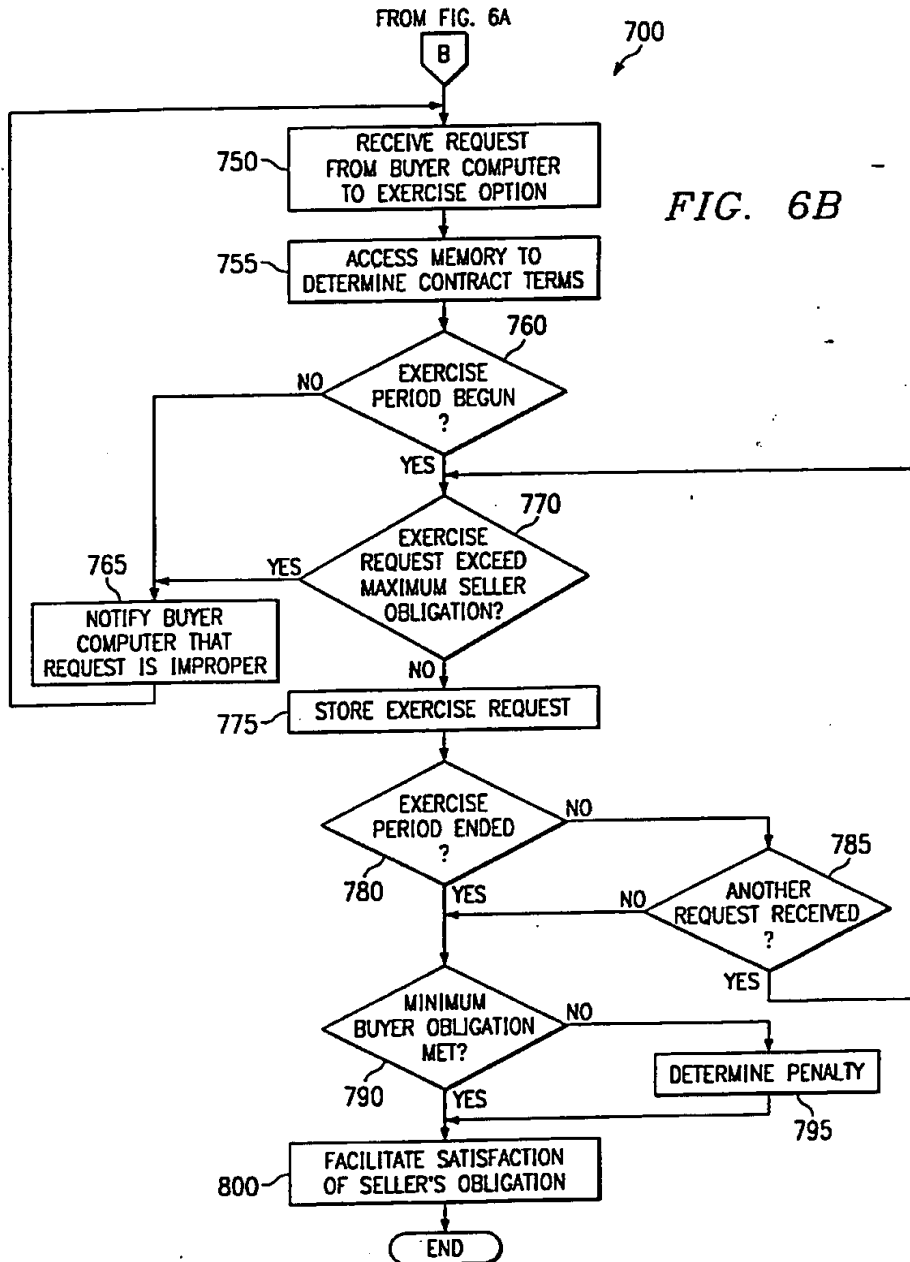


FIG. 6A





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# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 99/21655

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 G06F17/60

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 770 967 A (PHILIPS ELECTRONICS NV) 2 May 1997 (1997-05-02) abstract page 3, line 25 -page 4, line 8 page 12, line 10 -page 13, line 10 page 28, line 21 -page 29, line 21	1-37
A	WO 98 34167 A (WEBBER DONALD GARY JR) 6 August 1998 (1998-08-06) page 1, line 17 -page 2, line 22 page 11, line 17 -page 13, line 7	1-37
A	GB 2 293 902 A (I2 TECHNOLOGIES INC) 10 April 1996 (1996-04-10) page 2, line 11 -page 4, line 28 -/--	1-37

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"S" document member of the same patent family

Date of the actual completion of the international search

22 December 1999

Date of mailing of the international search report

13/01/2000

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Pedersen, N

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 99/21655

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2 302 427 A (I2 TECHNOLOGIES INC) 15 January 1997 (1997-01-15) page 4, line 9 -page 8, line 8	1-37
A	ANONYMOUS: "A Supply Chain Management Algorithm with Vendor Information via Internet" RESEARCH DISCLOSURE, vol. 41, no. 416, XP002126531 Havant, UK, article No. 416111 page 1	1-37
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Information on patent family members

International Application No

PCT/US 99/21655

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